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THE UNIVERSITY OF ALBERTA

MOTHER INFANT INTERACTION: A MICROANALYTIC STUDY OF TIME, INTENSITY AND EMOTION

BY

VIVIENNE JUNG

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER'S OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

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ABSTRACT

In this study, two mother-infant pairs were videotaped. One mother was clinically depressed and the other mother appeared to be normal. A microanalysis of the interactions between the mothers and their infants was performed. That is, measurements were made of certain very brief movements which apparently convey socioemotional information. Previous microanalytic studies with adult interactants suggest that the timing of particular parameters of behavior influence the perceptions and feelings they have about each other. The quality of the interchanges between adult and infant might also be understood in terms of their timing of behaviors. The micro units of behavior in this study included:

1) The durations of 'meaningful' movements or kinesic phrases, which represent communicative efforts were measured for the mothers and for the infants during spontaneous conditions, and simulated sad and happy conditions. Results of the analyses showed statistically significant differences between the depressed and the normal mother, during spontaneous conditions. In contrast, the durations of the phrase periods for the two mothers approximated each other when Sad conditions were introduced during the interchanges with their infants. The differences between the two infants also achieved statistical significance.
2) Kinesic phrases were categorized as either movements which occured simultaneously for a mother and infant, or in an alternating pattern (eg. one partner's movement followed the others). It was found that the total occurences produced by the

normal pair were more than three times as frequent as the number of events for the depressed mother and infant.

3) Additional frequency estimates were made for the number of "runs"of repeated movements (eg. relatively unchanging time durations or lengths from one movement to the next). The findings for run frequencies paralleled those observed for the occurances of alternating and simultaneous events.

4) Each mother-infant pair was observed for recurrent cycles of mutual attentiveness (these cycles reflect the intensity of interactions). No cycles of mutual attention occurred for the depressed pair, whereas the normal mother and infant score was within average.

Overall, the results have implications for assessing early social relationships and suggest possible interventions, if disturbances are detected. However, this research needs to be replicated before the results can be generalized.

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CHAPTER I

INTRODUCTION

Theories or explanations about early normal and abnormal social-emotional behavior and development have been exemplified by two divergent approaches. Restrospective or indirect methods typify the first major approach (Adler, 1982; Erikson, 1982; Freud, 1978). For example, Freud (1978) speculated about the early stages of development. He felt early childhood experiences become crystallized in subsequent interpersonal interactions and partially determine future personality characteristics.

The second major approach is represented by the behaviorists (Millenson, J. R., 1967; Skinner, 1953; Skinner & Epstein, 1980) who have developed an empirical method based on direct observation of behavior. Generally, the behaviorists do not make any inferences about and are not inclined to associate emotion with the observed aspects of behavior. Emotions are essentially a construct-based inference. For example, multiple stimuli or events may create the antecedent conditions for a particular emotion. Conversely, varied outcomes could result from the same emotion. Anger, for example, can be stimulated by hunger, thwarting of a goal, or negative expressions by the caregiver (Campos, Barrett, Lamb, Goldsmith, & Stenberg, 1983). Subsequently, the anger can be inferred from several different actions such as withdrawal or aggression.

Given current technology, the inferences and issues addressed by the psychoanalysts regarding the source of socio-emotional behavior can be investigated empirically with controlled conditions, which is the hallmark of the behaviorists. For instance, Freud (1978) addressed issues related to the ability of infants and young children to adapt to their parents during differing stages of development. Moreover, mechanisms used by children to cope with frustration, anxiety, or tension were a major focus. Some aspects of those experiences and social-emotional interactions have also been studied recently with the aid of special techniques. The use of

visual and audio equipment has made it possible to slow down the recorded behaviors in order to observe and time a series of very brief or fleeting facial expressions, bodily movements, and vocalizations that appear to convey information about mother-infant accommodation to each other and their apparent feelings during the interactions. Thus, observational methods have been applied to the investigation of repetitious exchanges at a micro level of analysis (e.g., events measured in seconds or less).

More specifically, with respect to the present problem, three characteristics of vocal and kinesic behavior are frequently examined separately, in much of the empirical micro-analytic research. These three different qualities are categorized as: 1) intensity level or degree of arousal, 2) timing or duration of intervals and 3) specific emotional expression, such as joy, sadness or anger.

Dimensions of interaction

Pertinent to this research are three dimensions of interactions (mentioned above) which implicate time patterns, feeling tones or intensity, and explicit or blended emotions. Throughout the life span, interactions between individuals seem to be influenced by the intensity of attention to each other, their particular emotions, and a time dimension implicating the give and take or flow of interchanges.

Time patterns. An extensive body of literature about adult interchanges indicates that social information is transmitted and encoded by the temporal properties of dialogues (Jasnow & Feldstein, 1986). In research with adult participants, individuals who tend to match each other's temporal speech patterns during a conversation are likely to view their counterparts as warmer, and more responsive, and sensitive (Feldstein & Wilkowitz, 1978). Temporal patterns of speech include parameters such as vocalizations or pauses. (A vocalization in this context is defined as a continuous sound uttered by one participant. A pause, however,

is the silent interval following a vocalization.) The matching of time parameters, such as vocal congruences between adults, is a powerful phenomenon that has been well documented (Beebe, Jaffe, Feldstein, Mayo & Alson, 1985). Accommodation to a partner's timing of vocal or kinesic acts is one aspect of behavior which enables people to enter into each other's perceptual experiences and feeling states. It is noteworthy that mothers and infants also appear to co-ordinate or match some of their vocal and kinesic temporal patterns. Those temporal patterns generally are measured in time units ranging from milleseconds to several seconds in duration. Many studies (Anderson, Vietze & Dobecki, 1977; Beebe, Jaffe, Feldstein, Mayo & Alson, 1985; Stern, Jaffe, Beebe & Bennett, 1975) which utilize these "micro" time units demonstrate mother-infant ability to influence each other.

Intensity. A different aspect of mother-infant behaviors involves the patterns of cyclical build-up and decline in attention or intensity described by Brazelton, Koslowski, and Main (1974). Cycles are characterized by phasic changes in infant behavior with gradual transitions from orientation to acceleration, peak excitement, deceleration, and withdrawal before a new bout of looking at the mother is initiated. Moreover, during harmonious interactions, there is notable increase in the attentive phase of the infant's cycle (Brazelton, Koslowski, & Main, 1974) and the frequency of mother-infant simultaneous cycling (Lester et. al., 1985).

Emotion. Another relevant variable during early interactions is explicit emotion. Cross-cultural studies by Ekman (1973), and Izard (1970) strongly suggest that persons from differing socio-cultural backgrounds associate particular facial expressions with specific emotional experiences. Although there are some discrepancies between studies, research into facial expression patterns has led to recognition of six basic emotions and the development of measurement systems for those coded emotional expressions (i.e. joy, surprise, fear, anger, disgust, and sadness).

In particular, two of the facial coding systems have been extensively researched. One of these, developed by Ekman and Friesen (1978), is known as the Facial Action Coding System (FACS), and it has been adapted for the study of infant facial expression. However, the application of this method is exceedingly time consuming, because FACS measures all facial behavior, even if they are unrelated to the expression of emotions.

In contrast, the current methods of Izard and Dougherty (1982) for the identification of facial expression in adults and infants, depend on detailed analysis only of those movement units or musculature actions which are important in determining the six basic emotions. To code facial emotional expressions with this procedure, two methods are used concurrently: The System for Identifying Affect Expression by Holistic Judgments (AFFEX) is a macroanalytic or holistic method of obtaining an overall gestalt of facial sequences. Subsequently, the Maximally Discriminative Facial Movement Coding System (MAX) is applied. This latter coding system is based on the identification, at a microanalytic level, of discrete anatomical movement units. It provides a precise and objective way of timing the facial expression sequences initially identified with AFFEX.

The general research question

Integration of dimensions. Specific emotions are discrete and intermittent occurances. In contrast, the timing and intensity factors seem to create a more or less continuous current of feeling tone. It can be expected that variables, such as specific or blended emotions, interweave with the feeling tones inherent in time factors and cycles of intensity. However a synthesis of the discrete emotions and the processes has not been systematically attempted in past research.

Previous research (Field, 1984) has demonstrated a marked reduction in positive emotional expression for depressed mothers and infants. Analyzing the cyclical patterns and the time parameters could demonstrate whether depressed dyads also show

concurrent changes in these dimensions. Thus, some support could be provided for the proposed integration of emotion, time and intensity during interactions.

Long term effects. The results of several research studies (Ekman & Friesen, 1978; Field, 1984; Stern, 1981; Tronick, Ricks & Cohn, 1982) suggest that young infants develop a prevailing mood or state integrated from numerous previous interactions with their primary caregiver. In accord with these findings, Demos (1982) has observed that, during early infancy, patterns of behavior are transient but gradually become more permanent aspects of personality structure as a result of maturation and transactions with the caregiver.

There are, interestingly, differences between the patterns of behavior observed in depressed mothers and those of normal caregivers (Field, 1984). The infants of depressed mothers exhibit deviant patterns which, it may be hypothesized, are, in part, the outcome of many previous interactions. However, there has been little systematic investigation of the mechanisms and processes which may contribute to those differences.

For this study, in an effort to measure the relatively long-term effect of abnormality on time and attention variables, a comparison between dyads with a depressed and normal mother is made. In general, it is hypothesized that altered effects will be observed in the organization of a dyad with a depressed mother in terms of time parameters and attentional cycles, during varied conditions.

CHAPTER II
REVIEW OF THE LITERATURE

Essentially, the focus for the present study is with three micro-features of behavior and their coordination during mother-infant interactions. The initial sections of this review deal separately with the features of intensity and time. In subsequent sections of the chapter, the relevance of intensity and time to normal and abnormal interactions is examined. Also discussed is how these very brief behavioral intervals or features are coordinated. Furthermore, the potential lasting effects are considered.

Intensity Level

In the following section, first the phenomenon of intensity of cycles is described and defined. Several studies which reveal the impact on cycles, as a result of the timing and/or degree of stimulation by the mother, are then reviewed. It is presumed, in the current study, that both appropriate timing of and degree of stimulation, will result in a greater number of cycles which occur simultaneously for the mother and the infant. Accordingly, a study which investigated the synchrony between mother and infant, in terms of the co-occurrence of their cycles, is also discussed. In the concluding pages of this section, an overview of the ongoing relevance of intensity level is given. Considering that ongoing role, it may be important to determine whether there is an early disruption of attentional cycles for depressed pairs.

Description of Intensity Cycles

The intensity of behavior or degree of attentiveness is one feature of behavior which apparently shapes socio-emotional interactions. This aspect of behavior has been studied extensively at a microanalytic level by several authors (e.g. Brazelton, Koslowski, & Main, 1974; Fogel, 1982; Mandler, 1975; Stern, Hofer, Haft, & Dore, 1985). The studies reviewed in this section provide a

description of attentive cycles, and information about their importance in the context of a mother-infant relationship.

Attentional cycles observed and described by Brazelton (1982) exemplify the intensity of behavior during infancy. Brazelton and associates investigated mother infant interaction on different levels. That is, certain studies were attempts to quantify the degree of affective arousal, while others involved detailed verbal descriptions of behaviors noted during slow motion films. The following observations are extrapolated from Brazelton's descriptive work.

In Brazelton's study, stop-gap films revealed that the expressions of infants, as well as their body movements, and vocalizations change sequentially in a characteristic pattern during brief face to face interactions with their caretakers. The process typically involves the infant in a gradual build up of excitement and directed attention. That phase is commonly terminated by gaze aversion before the infant engages in another bout of looking and responding (Brazelton, 1982). In contrast, while responding to objects, the infants show a sharp linear increase in rapt attention followed by a precipitous decline (Brazelton, 1982). Possibly the differences in the reactions of the infant toward objects could be explained in terms of the nature of social interactions. During social interaction, both the mother and the infant are responsive to each other. This mutual responsiveness, as well as the cyclical ebb and flow of aversion followed by directed attention, generally is an integral part of an infant's interaction with his caregiver. This kind of interaction may be essential for normal social development.

Degree of Stimulation: Effect on Intensity Cycles

If infants are unable to regulate the tension level in an alternating pattern, they will show negative effect. For example, five week old infants who become overly stimulated or "stimulous bound" by certain visual displays, gradually demonstrate vigorous activity and crying (Tennes, Emde, Kisley, & Metcalf, 1972). It appears that visual attention is characterized by waxing and waning of fixations, in coordination with the intensity of other behavior. If

that pattern ceases (e.g. as a result of inappropriate stimulation) the infant shows negative affect or signs of distress (Tennes, Emde, Kisley, & Metcalf, 1972).

Possibly, understimulation, as well as overstimulation, has particular consequences for the infant's pattern of alternating tension levels. However, the effects of general understimulation (such as maternal apathy) for infant attentional cycles has not been assessed to date.

The characteristic decrease in energy and activity level of a depressed mother, may create less stimulating social milieu for her infant and reduce the amount of mutual attentiveness to each other. That decrement in responsiveness, theoretically, should be reflected in fewer cycles during their interaction. Therefore, this study will involve a comparison between a depressed mother with her infant, and a normal dyad, in terms of the frequency of their cycles of intensity.

Timing of Stimulation: Effect on Intensity Cycles

The studies reviewed below implicate timing of stimulation and its relationship to the phases of attentional cycles. Although the different phases of a cycle are not assessed in the present study, the phases are associated with timing of stimulation by the mother. The time when stimulation is given by the mother seems to be another important feature, which has an impact on the attentiveness of the infant.

The findings of Fogel (1977) regarding gaze direction for mother and infant are consistent with the aforementioned descriptions by Brazelton (1982) about the cyclical build-up and decline in attention. For example, Fogel (1977) reports that the exaggerated facial expression of a mother increases the probability of prolonging infant attentiveness. Possibly the increased activity and exaggerated facial expression of the mother is timed to the acceleration portion of the attentional cycle displayed by the infant. In contrast, the gaze of the infant is more likely to begin when a mother is behaviorally inactive. This beginning gaze may coincide with the time of the quiet phase, preceding initiation of an

attentional cycle. Moreover, the descriptions by Brazelton (1974) of individual differences between dyadic pairs corresponds to the findings of Fogel (1977). According to Brazelton (1974), if a mother continues to stimulate the infant after he has initiated a withdrawal (e.g. during the quiet phase), the non-interactive period is increased for that infant. From the opposite perspective, for more harmonious pairs, the most significant effect is a reduction in the quiet or inactive part of the cycle.

From the above studies, it appears that both the level of stimulation given to the infant, in conjunction with a sensitivity to the time of his phases, will influence interactions between the pair. However, there are no extant studies which explicitly investigate the different phases in terms of their integration with other dimensions of behavior, such as timing. As mentioned above the varying phases of intensity levels are not being specifically examined in the current research. Nevertheless, if time pattern changes are observed for abnormal dyads, it can be assumed that the timing of cyclical phases will also be effected. Time patterns are discussed later in this chapter.

A study (Field, 1982) with premature infants also brings into focus the importance of examining both the degree and timing of stimulation. Although Field (1982) did not specifically investigate cycles of intensity, her findings suggest that mothers of premature infants generally play less frequently with their babies. However, they persist longer with stimulation after a baby has already responded with a smile or laughter. A significantly greater number of these interactions are terminated by the infant with gaze aversion, followed by fretting and crying (Field, 1983). Possibly, the reaction of these infants then discourages the mothers from introducing stimulation subsequently. Thus, a pattern of dysynchronous interactions may result from both inappropriate timing and reduced stimulation.

Field's study highlights the effect for the dyad of an abnormality in the infant. From a different perspective (e.g. a maternal disorder) the effects of the responses of a disturbed

mother are also pertinent. As discussed above, in this study, it is expected that the depressed mother will demonstrate a reduction in responses to the changing levels of intensity in her infant. Furthermore, it is proposed that her reaction will result in dysynchrony and fewer cycles.

Mother and Infant Simultaneous Intensity Cycles

The responsiveness and timing by the mother presumably is associated with her own concurrent cycles of attentiveness while interacting with the infant. In a research study by Lester, Hoffman and Brazelton (1985) cycles were defined in terms of mutual responsiveness between mother and infant. Lester et al. (1985) attempted to measure the intensity of simultaneous or synchronous cycles for term and pre-term infants and their mothers. That study is particularly pertinent in considering mother-infant, cyclical synchrony and dysynchrony.

The analysis by Lester et al. (1985) suggested that synchronous cycles between mother and infant increased with age (e.g. from three to five months). But, a comparison between term and pre-term infants and mothers, indicated relatively less synchrony for the pre-term babies and their mothers at both three and five months of age. Nonetheless, Lester et al. (1985) were unable to detect a difference in the degree of synchrony between sick pre-term infants with their mothers, and healthy pre-term infants with their mothers. The authors suggested, ". . . that the level of analysis reported here may be too gross to distinguish sick from healthy pre-term interaction patterns" (Lester et al., 1985, p.24). In addition, the behaviors they studied may not have been sufficiently inclusive to identify differences between some normal and abnormal patterns. For example, measurements of kinesic or vocal time parameters were not incorporated into the system. In general, the results supported a hypothesis that abnormality in one of the partners will alter their cooccurring cyclical patterns, but an important time dimension of socio-emotional interactions was excluded from this analysis. The dimension of time will be monitored in the current study and analysis.

Prevalence and Ongoing Role of Intensity

The prevalence and ongoing role of intensity for the mother-infant relationship is discussed in the following section by reviewing and synthesizing the conclusions of several authors.

Stern, Hofer, Haft and Dore (1985) identified another component of intensity, which they claim captures, at a nonverbal level, some of the essence of interpersonal intimacy. This component of intensity will not be included in the present research. However, the literature as it pertains to cycles will be discussed. In contrast to the descriptions by Brazelton (1982) of recurrent, cyclical patterns which involve several behaviors, Stern et al. (1985) examined a different intensity phenomenon. They gave the label of "affect attunement" to this dimension. During affect attunements, mothers and infants tend to match the partners discrete behaviors cross modally. For example, the intensity of a vocalization by the mother, will frequently match the intensity displayed by a kinesic act of her infant.

The results of research by Stern et al. (1985) with infants between 10 and 12 months show that mothers as a group use attunements as their most frequent style of responding to the affect displays of babies.

Interestingly, the attentional cycles investigated by Brazelton et al. (1974) and the attunements studied by Stern et al. (1985) both addressd the issue of intensity. Possibly, the degree of intensity is one of the qualities which plays an important role in interactions at varied ages, although the particular configurations while relating may change. By abstracting from the work of Stern et al. (1985) and Brazelton et al. (1974), younger and older infants can be compared with respect to intensity configurations. In the study by Stern et al. (1985), there are certain pertinent findings about attunements for older infants (over 6 months) and their mothers. For instance, the pairs demonstrate corresponding intensity patterns in a single behavior, which frequently involves a different modality for each member of the pair (e.g. vocal or kinesic). Conversely, the results of the study by Lester and colleagues (1985) show that during earlier

interactions, (with infants younger than approximately 6 months), intensity configurations are composed of diverse, simultaneous acts, and a series of sequential behaviors.

Thus, the attunements which are a frequent occurance for older mother-infant dyads may not reflect a sharp demarcation from past interactive behavior. Lester et al. (1985) also have suggested that the synchronized interactions during early infancy have repercussions for later socio-emotional development.

In the context of this research, the focus will be on the beginning intensity patterns which emerge during attentional cycles. Since intensity matching between mother and infant is one of their most frequent modes of behavior when the infant is over 6 months (Stern, 1985), understanding its early beginnings during attentional cycles could be especially useful.

Summary Related to Intensity

In summary, attentional cycles appear to be one of the important processes influencing early interactions between mother and infant. The cycles of the infant are influenced by the overall degree of stimulation in association with its timing. As well, the recurrent cycles of intensity are displayed by both members of the dyad. Therefore, abnormality in either partner may disrupt their cyclical synchrony and mutual attentiveness. That could adversely effect the development of the infant. According to Sroufe (1978), "caregivers may be so effective in promoting development because they . . . tune their behavior to the infant's tension level, catching it at the peak of organized engagement, rather than simply because they respond to its behavior in a reliable, mechanical fashion" (pp. 507-508).

Considering the apparent importance of intensity cycles for mother-infant social interactions, it could be productive to explore the outcome of long term changes in these cycles, which may result from maternal depression. Accordingly, in this study the frequency of co-occurring intensity cycles for both a depressed and a normal mother-infant pair is examined.

Time Patterns

Furthermore, as mentioned above, the research studies of attentional cycles frequently involve detailed clinical descriptions of a large number of co-occurring behaviors. This information provides the data which is used to estimate the periodicities of intensity and arousal. Conversely, the time dimension studies discussed before do not systematically assess the accelerating and receding intensity levels. Time parameter research implicates a relatively limited number of different categories of behavior, which are measured precisely. As well, it should be noted that the precisely measured behaviors could occur during an attentional cycle, or alternately, when a cycle is not in progress.

The numerous time studies relevant to this project will be dealt with in terms of three main areas: 1) types of interactions or events, 2) duration of parameters, and 3) temporal and content runs.

Types of Time Events (Coaction and Alternation)

Coactivity or alternation illustrates the types of temporal coordinations used by mothers and infants during their interactions. Due to the apparent importance of these temporal processes between partners, the proportion of time which involves mother-infant pairs in vocal coaction, as contrasted to an alternating pattern of interaction, has been examined by many authors (e.g., Anderson, Vietz & Dokecki, 1977; Elias, Boerse, Hayes & Jackson, 1984; Jasnow & Feldstein, 1986; Rosenthal, 1982; Stern, Jaffe, Beebe & Bennett, 1975).

Patterns of coactivity and alternation implicate the time of onset for a person's vocalization and the succeeding pause or silent period before the partner initiates another vocal utterance. During an alternating episode, the response is initiated within one second after termination by the other participant. Conversely, in coaction the onset of a vocalization for one member occurs while the partner is in the process of vocalizing. Those relationships are illustrated in Figure 1 (page 50).

Although several studies (Anderson, Vietz & Dokecki, 1977; Rosenthal, 1982; Stern, Beebe & Bennett, 1975; Rosenthal, 1982; Stern, Beebe & Bennett, 1975) have made credible the view that co-vocalizations occur with considerable more frequency than alternation during infancy, recently that suggestion has been questioned. Later studies of mother-infant interactions (Elias, Hayes & Broerse, 1986; Jasnow & Feldstein, 1986) reveal that alternation significantly exceeds simultaneous vocalizations for mother-infant dyads.

Despite the apparent overall predominance of alternating vocalizations, the study of Stern and colleagues (1975) suggests an association between coactive episodes and high arousal levels. The high proportion of vocal coaction during intense periods of arousal also parallels the findings of Beebe, Stern & Jaffe (1979) who report frequent mother and infant simultaneity in kinesics. In contrast, alternation is correlated with a moderate degree of arousal (Stern et al., 1975). Thus, both alternation and coactivity are important time patterns that are exhibited by mother and infant when they are coordinating their behaviors.

But it is not known whether the pattern of coactivity and simultaneity which apparently develops and prevails at frequent moments early in life is reduced during situations, such as maternal depression, with its characteristic pervasive apathy. In this study it is hypothesized that the frequency of alternating and coactive kinesic patterns during interaction will be reduced when a mother suffers from depression. That expectation is based on the overall reduction of responsiveness and increase in behaviors unrelated to her infant for the depressed mother. As part of the research associated with the current study, a "depressed" and "normal" dyad will be compared in terms of the frequency of their respective coactive and alternating episodes.

Time Durations of Phrases*, Pauses and Phrase Periods

The studies discussed above mainly pertain to the time of onset or initiation of behaviors. Another aspect of interaction observed in adult dialogue includes matching by the participants for

the durations of parameters, such as pauses. In this section the time parameters to be discussed will first be defined and then several relevant studies will be reviewed.

Definition of parameters. The major parameters or units of behavior which will be discussed in the subsequent review are vocal and kinesic phrases, pauses, and phrase periods. A vocalization is defined as one continuous utterance, and a pause is the ensuing silence. Similarly, in the kinesic realm, a movement and its following behavioral silence are parallel units of action. Either a movement or a vocal phrase, and the subsequent pause, constitutes one behavioral phrase period. These parameters are included and illustrated in Figure 1 (page 51).

*Note: For clarity of reading, the distinction between "phrase" and "phase" is given. The duration of "phrases" described in this section is a vocal or kinesic parameter. In contrast, the "phase" relates to cyclical patterns reviewed in the preceding section about intensity.

Although there are some discrepancies from study to study, Stern and colleagues (1977) report that maternal vocal phrases and pauses last approximately .47 and .9 seconds respectively. Whereas kinesic phrases for the mother are 0.82 seconds long and the following pause durations are about 1.06 seconds. The same parameters for infants are all somewhat briefer. For example, kinesic phrase intervals for an infant averaged approximately 1/2 a second in the data of Beebe and colleagues (1977).

Time matching studies. The investigations briefly described below bring into focus the interesting phenomenon that mother and infant tend to match each other's durations of kinesic and vocal behaviors. It is noteworthy that the parameters are also typically part of adult conversations. Furthermore, matching of these parameters is frequently demonstrated to be related to the feelings of the participants about each other. However, matching of time parameters is not assessed in this study. The literature about matching or congruencies has been reviewed to demonstrate the general relevance of time dimensions for mothers and infants.

Results of several investigations (Beebe et al, 1985; Jasnow & Feldstein, 1986) concur in showing that mother and infant match each other in terms of the durations for vocal switching pauses. (A switching pause is defined as the behavioral silence, before the partner takes his/her turn.) Although the findings vary, Beebe et al. (1985) were also able to demonstrate kinesic matches between an adult and infant with respect to their durations of phrases, pauses and phrase periods.

According to Beebe et al. (1985) the mother and infant accommodation to each other, in regard to their timing of actions ". . . provide a behavioral basis for knowing one important aspect of the other's perception, temporal world, and feeling state" (p. 243). Possibly these perceptions and feeling states are partially lacking for abnormal mother-infant dyads. Individuals who suffer from depression are frequently withdrawn and preoccupied with their own dysphoria and discomfort. Thus, it is expected that a depressed mother and her infant will show commensurate reductions in time matches for most of the parameters discussed above. It is also anticipated that the reduced matches are associated with a general change in the respective time parameters for each member of the pair.

In this research, those changes will be estimated in terms of the mean durations of phrase periods, for the mothers and infants separately.

Timing of Runs

Temporal runs. Compared to the time parameters discussed in the preceding section, temporal runs are longer units of behavior. These temporal patterns implicate the slightly longer, and more complex, repetitive phrase periods. According to Stern (1977), events such as play periods for the dyad, are characterized by congruences between mother and infant for these temporal dimensions. For example, during a repetitious temporal run, the movements or vocalizations may be altered, but there frequently is a relatively constant tempo, and both mother and infant coordinate these common time features.

Furthermore, Beebe and Gerstman (1984) noted a significant covariation between the tempo of the mother during her hand games, and the positive facial expression of the infant.

In considering the tendency for the dyad to match each other in terms of their tempos, and the responsiveness of the infant to runs, the following suggestion is made: Abnormality in a mother, such as depression, will be reflected in changes for run frequencies for both members of the dyad.

Content runs. Another category of runs which appears to strongly effect the infant involves the repetition of content, irrespective of time similarity or dissimilarity. (It should be noted that the mother's repeated content phrases can show markedly different time durations, e.g. the vocal phrases "Hello baby love" can be easily reiterated as "Heeeeeloobaaabeeeeeluuuuuve.")

With regard to this category of run, Stern and Gibbon (1979) examined the patterns of mothers, since a significant proportion of all their phrases are likely to be repeats of the immediately preceding content.

According to Stern & Gibbon (1979) the mother's time patterns during vocal content runs are used to alter and sustain the affect and attentional process of the baby

It is possible that a normal mother will also frequently display the kinesic content repeats which are typical of her vocal productions. In contrast, the infant of the depressed mother is likely to be exposed to fewer maternal runs. The above premise will be examined in this study.

Summary Related to Timing

In summary, several time patterns appear to be important phenomena during early socio-emotional interactions. Current research also suggests that specific behavioral categories may be less relevant early in infancy. In contrast, young infants and their mothers are capable of mutual influence with regard to time parameters. The three dimensions of time parameters which appear to be particularly potent in altering social interactions are briefly reviewed. First, durations of some speech related components, such

as vocal or kinesic pauses and phrase-pause periods show evidence of matching and mutual influence during mother-infant interchanges. Second, the timing of repetitious temporal runs appear to be coordinated by mother and infant, especially when the pair are involved in play periods. As well, runs of maternal content repeats are a frequent occurence. Third, a somewhat different parameter involves onset to onset times. The onset times, or initiation of a vocalization or movement, which is preceded by the partner's behavior also shows a strong tendency toward mutual influence. Further, coaction or simultaneity, and alternation are determined by those onset times. The former type of interaction predominates during high arousal episodes, whereas the latter type is prevalent during moderate levels of arousal. However, the time dimensions discussed above have not been assessed for possible atypical patterns induced by abnormal maternal behaviors.

In general, it is apparent that either member of the dyad may be potent in changing the temporal direction of social interactions and the accompanying feeling tones linked to the patterns. There is, however, one caveat. Despite the mutual contingencies, the preponderance of activity is provided by the mother who interjects background expressions or coaxes behaviors from her infant, apparently in an effort to draw him into her social or interactive orbit (Kay, 182). Nevertheless, the innate time patterns of the infant seem to make him/her uniquely endowed to enter into social interactions (Kay, 1982).] The mutuality in adaptation is highlighted by the dramatic alterations observed when the behavior of one of the partners deviates from normal expectancies (e.g., prematurity in the infant or maternal depression). Therefore, it could be fruitful to systematically investigate the impact of abnormal or diverse experiences on the time parameter processes.

For this study, differences between a Depressed and a Normal dyad will be investigated with respect to the frequencies, or the durations of the four time parameters reviewed in the foregoing section.

Maternal Depression and the Relationship to Time and Intensity

In terms of global effects of maternal depression, an experiment by Field (1984) is particularly pertinent. In that experiment the interaction of a group of depressed and non-depressed mothers was compared. The results showed a significant difference for the two groups with infants of non-depressed mothers displaying pronounced negative affect, protest behaviors, and higher activity levels during simulated depression in their mothers and the subsequent reunion period. In contrast, the infants of the "Depressed Group" showed relatively fewer positive reactions and more protest during spontaneous interactions. Nevertheless, they appeared significantly less distressed by the diminished activity and negative expressions of their mothers, compared to the normal group in the simulated depressed condition. The behavior of the infants in the depressed group did not vary in the depressed and reunion situations. It is likely that those deviant patterns are, in part, the outcome of many previous repetitive interactions.

Apparently infants adapt to an abnormal (depressed) mother with a congruent decrease in responsivity and an increase in ongoing relatively low level of expressions of negative affect.

However, these observations are global descriptions of negative and positive behavioral responsiveness (e.g. crying). As discussed previously, in research utilizing micro-units of measurements, the results suggest that adult interactants who match each others temporal speech parameters are likely to view their partner as more responsive, sensitive and warmer.

If responsivity and ongoing feeling tones are related to time and tension factors, the latter dimensions should alao show changes for dyads with a depressed mother. Furthermore, as noted above, a normal infant who is briefly exposed to a depressed mother is likely to exhibit comparatively greater changes in discrete negative affect and activity level. But it is not known how these global differences

between transient and enduring depressed conditions are reflected in the respective time and tension patterns.

For this study, the intensity and time parameters of a Depressed and Normal dyad will be assessed during varied conditions in order to obtain information about transient conditions and enduring effects. The conditions simulated for each dyad consisted of spontaneous, sad and happy situations. These conditions will be discussed further in Chapter III.

Coordination of Variables and Enduring Effects

One of the general proposals for this study is that intensity, time parameters and specific emotions are all coordinated during interactions. Since discrete emotions frequently co-occur with the time and intensity processes, relevant aspects of the literature about emotions and facial expressions will be briefly reviewed. As well, some of the crucial factors, which appear to lead to long term effects are included in the following review.

The research study cited below points to the importance of the coordination between time dimensions and emotional variables. For example, Murray and Trevarthen (1985) examined infants' differential social reactions to varied conditions by introducing selective disturbances during interactions. In one part of the experiment, the reaction of the infant to the presentation of a "Blank-face" by the mother was compared to behavior while interacting with a TV image of his mother.

The results were summarized by Murray and Trevarthen (1985) with the following observations:

> Thus whereas the patterning and organization of . . . acts in the Blank-face condition gave an impression of solicitation or effort oriented to the mother to reinstate mutually responsive interactions, the feeling conveyed by the

> infant's behavior in the Replay is one of detached, unhappy puzzlement or confusion (p. 191).

Significantly, both conditions presented the baby with a mother who did not respond contingently, albeit in different ways. The differences detected by the young infant between the two negative conditions probably implicates his ability to coordinate affective expressions with their time of occurence during interactions.

Presumably, the discrete emotional expressions, such as anger, joy, surprise, interest and sadness are also synchronized or coordinated with the intensity levels and temporal patterns.

With respect to more enduring effects, the ontogenesis of several discrete emotions has been mapped for infants. But the developmental changes occur primarily in the context of the dyadic relationship which apparently is determined in part by their congruencies and coordination for time and attentional processes, as well as emotional expressions. The "ontogeny" of those interactions would likely involve the cumulative outcome of numerous exchanges between mother and infant.

In terms of affect, several studies and hypotheses (Plutchik, 1980; Field, 1984; Tronick, Rick & Cohn, 1982; Stenberg, Emde & Campos, 1983) suggest that past repetitive interactions have prolonged influence on subsequent behaviors. For example, repeated experiences are postulated by Plutchik (1980) to be precursors to more enduring personality traits. That postulate is supported by the research of Tronick et al. (1982). Protracted affect emerging from early interactions is the central theme in their research. This study is, in part, replicated by Field (1984), whose experiement is described above. Tronick, Rick, and Cohn (1982) have used simulated conditions to assess the effect of continuous flattened affect on the infant. They report that the adaptation to the simulated style of the mother persists into the next period of time despite the resumption of normal behavior.

As well, there is additional evidence suggesting that the responses of an infant to negative social conditions varies according to the type of previous interactions he or she has experienced. A study of Stenberg, Campos, and Emde (1983) illustrates those effects. They applied a modified version of Ekman and Friesen's (1978) scoring method to determine patterns of angry facial movements elicited by removal of a teething biscuit in 7 month old infants. The results showed a sharp increase in angry components with each successive trial, while non-angry facial components remained stable (Stenberg, Campos, & Emde, 1983). Thus, any given trial was influenced by both present and past conditions. A study by Stenberg (1982) replicated those findings using varied elicitors and different scoring and sampling techniques for infants 4 and 7 months of age.

Generally, the results of several research studies support a premise that repetitive interactions have enduring effects for infants. In Demos' (1982) research with young children, she also observed that transient patterns of behavior tend to become more stable with age. As well, the research study (Field, 1984) reviewed previously suggests that dyads with depressed mothers respond differently from "normal" mother-infant pairs for an extended time period. However, the role of process variables in the development of enduring characteristics is not understood.

Summary Statement

If repetitive styles of interchanges between mother and infant are presumed to lead to relatively stable patterns, then, comparing the processes for a depressed and normal dyad could suggest some of the moment-by-moment patterns which have predominated during their interactions. Thus, a depressed and a normal mother-infant dyad were selected for this study in order to examine certain aspects of their time patterns and attentional cycles. It was predicted that significant differences would be found between the

two dyads, for the frequency, timing and durations of their movements and cycles.

The depressed mother who participated in this study displayed subjective and objective symptoms of depression. Her normal counterpart, in contrast, did not report or demonstrate signs or symptoms of depression. A more detailed description of the characteristics of the mothers is provided on page 25 in the following section.

Hypotheses

From the preceding review of research relating to time, intensity and emotion in mother-child interaction, certain specific research directions emerge. Stated as hypotheses these directions are:

Intensity Cycles

Hypothesis I: During Spontaneous conditions, the frequency of simultaneous or synchronous attentional cycles for a normal mother and infant, will be greater than the number of cycles for a depressed mother and infant, under similar conditions.

Timing: Co-action and Alternation

Hypothesis II: (a) In observing a Depressed and a Normal dyad with respect to the number of coactive and alternating episodes, these events will be comparatively less for the Depressed dyad.

(b) The proportion of coactivity (in contrast to alternation) will be greater for the Normal dyad and lower for the Depressed dyad.

Timing: Frequency of Runs

Hypothesis III: During Spontaneous conditions, the depressed mother will show a decrease in the total number of runs, compared to a normal mother.

Hypothesis IV: During Sad conditions the normal mother will show a relatively greater decrease in the total number of runs in comparison to a depressed mother.

Hypothesis V: During Sad conditions an infant with a normal mother will demonstrate a relatively greater decrement in the total number of runs, in comparison to an infant with a depressed mother.

Timing: Durations of Phrase Periods

Hypothesis VI: In comparing a normal and a depressed mother during Spontaneous conditions, the depressed mother will demonstrate a marked reduction in the average duration of her phrase periods.

Hypothesis VII: During Sad conditions, the normal mother will show a pronounced decrease in the durations of phrase periods, compared to her average length of phrase periods in the Spontaneous condition. Conversely, for the depressed mother, her average phrase period durations will not show a significant change between Spontaneous and Sad conditions.

Hypothesis VIII: In comparing an infant of a normal mother to an infant with a depressed mother, the two infants will demonstrate significant differences in terms of the durations for their respective phrase periods.

Hypothesis IX: In a comparison between Spontaneous and Sad conditions, the infant of a depressed mother will not show a significant change in his/her phrase periods.

CHAPTER III

A description of the subjects is given, the method of data gathering is discussed, the special devices or equipment are explained and the overall procedure is more sharply defined in this chapter. Finally, the method of analysis is described.

METHOD AND PROCEDURES

Subjects

Microanalytic research of this nature characteristically only requires a small number of subjects who are studied intensively (Beebe et al., 1985). Therefore, this study was an in depth investigation of mother-infant dyads; one consisted of a normal mother with her infant, and the second pair was a depressed mother and her infant.

The normal mother was selected from a group of women who responded to a radio announcement, requesting volunteers for the project. Her recordings were used for the study because they seemed to represent a good interaction, characterized by considerable positive affect and attentiveness early in the session. A depressed mother was referred by a local obstetrician/ gynecologist who initially observed symptoms of depression. A psychiatrist confirmed these observations and subsequently the mother was treated for clinical depression. Her symptoms, at the time of the study included dysphoric mood - sadness, a sense of hopelessness, loss of interest in her usual activities, apathy, generalized fatigue and appetitie disturbance. The mother also reported that in the past she had experienced a similar episode, which was successfully treated with antidepressants.

Both babies were between 4 and 5 months of age. There was no history of birth trauma and they were in good health.

Prior to the filming sessions, each volunteer was given a consent form, which contained an explanation about the nature of the project. (A copy is included in the appendix.) In addition, ample

time was allowed for the mother to ask questions and to create a relaxed and comfortable atmosphere for the mother and baby.

Equipment

Recordings were made in a laboratory located in the Faculty of Education building at the University of Alberta. The room was free of other people or distracting objects. In terms of the baby's position, he was reclining (at approximately a 30° angle) in a commercial baby seat with a head rest. That position permitted uninhibited head turning and free limb movement. The mother's seat was placed about 18 inches directly in front of her infant.

A video cassette recorder with a special effects generator was used in order to produce a simultaneous split screen image of the mother and infant. Subsequently, the recordings were transposed to 1/2 inch tape with a digital time code printed on the tape. For the viewing of these tapes the equipment contained a variable search control mechanism. Thus, the tapes could be slowed to any pace, or advanced frame by frame. This procedure enabled accurate recording of the time frames printed on the tape.

Units of Measurements

In the next section, the dimensions of behavior will be described mainly in terms of the methods used for timing durations or occurances. First, the scoring of attentional cycles is discussed. As reported in preceding sections, these cycles generally last between 15 and 30 seconds. In the subsequent section, techniques of measuring the briefer time parameters are described. That section describes how the estimates of kinesic phrases and pauses are obtained. As well, the criteria for identifying and scoring runs of repeating phrases and pauses is discussed.

The above time units are measured for the individual subjects. In contrast, the type of events, such as alternation or coactivity, involves timing when a phrase or pause occurs, in relation to the

production of a phrase or pause by the partner. Information about the manner of scoring the latter type of events is also provided.

Attentional Cycles

When scoring for synchronous behavioral cycles, the tape was viewed separately for mother and infant. As well, the tapes were rerun as often as necessary to identify the designated components of a cyclical episode, and time its beginning and end. Initially, a cycle was identified as a gestalt. Subsequently, in order to estimate the beginning and end of the cycle, time boundaries or "cut-off points" had to be established which differentiated it from other behaviors not included in the attentional cycle. With respect to the time boundaries of an attentional cycle, if any behavioral silence or change in behavior exceeded three seconds, the cycle was scored as terminated. The three second criteria was based on the research of Fogel (1977), Lester et al. (1985), and Stern et al. (1977).

Stern and colleagues (1977) identified episodes of maintained engagement (EME) for the mother as one of the longest structured time intervals. These episodes correspond to the durations and descriptions of attentional cycles. Both the EME and the cycles are reported to last approximately 15 to 30 seconds. An EME according to Stern and colleagues (1977) may contain two or more runs and is bounded by a change in behavior, such as relatively diminished activity, vocal silence, or a refocusing of attention. Moreover, in a later study, Stern and Gibbon (1979) used their findings to establish the time period for these changes which separated one EME from a prior or subsequent EME produced by a mother. The data of Stern and Gibbon (1979) indicated that the separating intervals generally exceeded three seconds. Fogel (1977) also reported the existence of longer "time out" intervals for the infant. These longer time out periods were found to range from three to five seconds, and typically occurred while the infant consistently looked away from the mother, or closed his eyes. Similarly, the long inactive periods as defined above by both Fogel (1977) and Stern et al. (1977), are congruent with the withdrawn, inactive phase of attentional cycles.

Therefore, in this study, when observing attentional cycles, a withdrawal phase was scored for an interval that lasted at least three seconds. As well, in order for a cycle to be scored as synchronous, the mother and infant had to initiate and terminate their attentive period within three seconds of each other.

Further observations for the identification of a cycle included direction of gaze, positive affect and repetitive movements. No attempt was made to differentiate the phases of the cycles or the degree of intensity. An attentional cycle was recorded if the gaze direction was toward the partner, positive affect was present and mother or infant showed episodes of repetitive ("playful") movements. The cycle was considered to be terminated if the behavior changed to gaze aversion, neutral or negative affect, and behavioral silence or altered activity and if these changes lasted more than three seconds. For example, a mother's behavior could alter from head nodding and hand games; to leaning back in the chair, peripheral or side gazing at the infant, and adjusting her own hair. (For a more detailed description of behaviors noted during cycles, see Appendix.)

Time Parameter

Phrase periods. The following definitions and estimates of durations for kinesic phrases and pauses are based on the methods of Beebe, Jaffe, Feldstein, Mayo & Alson (1985) and Stern, Jaffe, Beebe, Bennett (1975). In accord with their findings, for this research a movement was defined as a "meaningful" segment of behavior which was in the process of changing. Stern, Beebe, Jaffe and Bennett (1977) relied on the observer's experience and knowledge to identify meaningful units of behavior. These authors applied the term kinesic phrase to ". . . any facial and/or head movement or constellation of movements that 1) constitutes a burst of behavior . . . and 2) that has the obvious intention to attract, hold . . . or in some way alter the infant's attention" (p. 181).

For the observations associated with this research, after a kinesic change was identified as a gestalt, the tape was rerun and

slowed in order to time the beginning of the designated movement. The measured duration of a kinesic phrase included the movement in transition and the following steady state or fixed position. A succeeding pause was then measured from the moment when the fixed position was terminated. Both the duration of phrase and the duration of the following pause constituted a phrase period.

Temporal and content runs. A temporal run consisted of one or more repetitions of a kinesic phrase and pause period which did not exceed certain time limits. Based on Stern, Beebe, Jaffe and Bennett (1977) findings, the following time limits were used as the criteria for a temporal run: 1) two or more repeating phrases which did not differ from each other by more than 0.3 seconds in duration and 2) two or more repeated pause durations which did not differ more than 0.3 seconds.

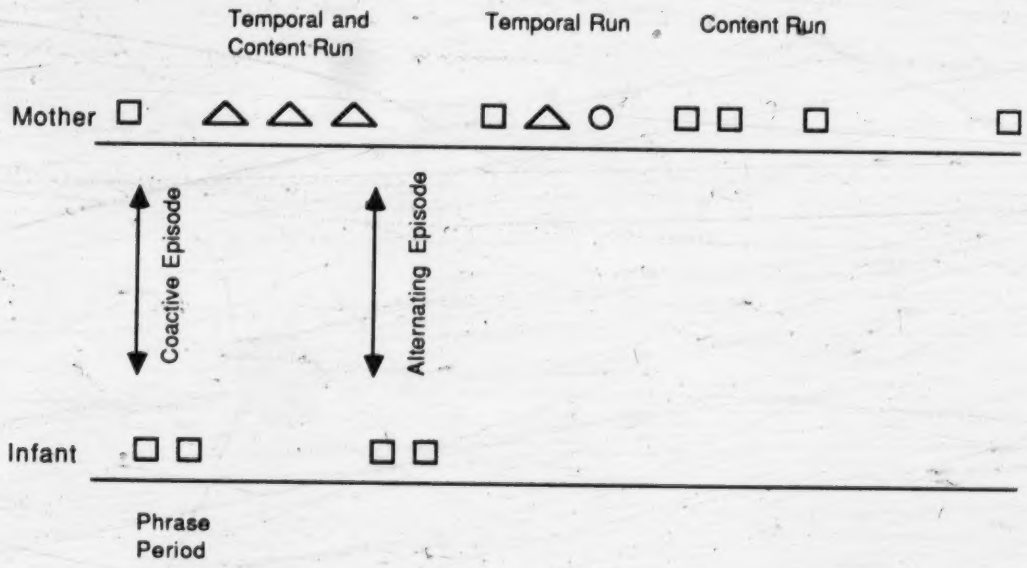
In contrast, a content run was considered to be two or more repeats of the particular activity or kinesic phrase episode. For example, if the mother's hand and head movements are both identical to the immediately preceding one, it was categorized as a content run.

For those repetitions which fulfilled the criteria of both temporal and content runs, each category was recorded and included in the data separately.

Coactivity & Alternation. In regard to the relationship between a phrase produced by the mother and the concurrent phrase of her infant, these episodes were measured in terms of alternation or coactivity. If any portion of a phrase overlapped in time with the partner's phrase, then the episode was considered a simultaneous or coactive event. In contrast, an alternating episode was scored if either of the following criteria were fulfilled: the beginning of the mother's phrase occurred during the infant's pause and within one second after the pause was initiated. Conversely, the infant's phrase could begin within one second after the mother's pause began to meet the criteria of alternation.

All of the time parameters described in this section are illustrated in Figure 1.

Figure 1
Diagramatic Representation of Time Parameters



Diagramatic representation of time parameters.

* = the varied shapes reflect different movements or phrases.

Reliability. Interrater reliability was tested in terms of the percentage agreement between two observers. With this method, there was 95% agreement for the two observers as to whether a movement occurred. In regard to the beginning and end of these movements or phrases, any estimate by both observers which was within three frames of each other, was considered an agreement. Using this criteria 85% agreement was achieved.

Data Collection

Interactions between a mother and infant were videotaped for two continuous minutes during each of three specified conditions.

The sequential six minute period was composed of the following conditions: Spontaneous-Sad-Happy.

In preparation for the Spontaneous condition, a mother was asked to play with her baby naturally, as she does at home. For the Sad condition, the mother was instructed to recall those days when she felt low and lacking in energy. Whereas prior to recording the Happy situation it was suggested that she have as much fun as possible with her baby.

Data Analyses

Attentional Cycles

The cycles of intensity were measured in terms of occurances. For each dyad, the number of synchronous occurances were estimated during the two minute Spontaneous condition. Subsequently, the data were compared to the expected average. As reported by Brazelton and colleagues (1982), an average of 2 to 4 cycles per minute occur during harmonious interaction.

Time Patterns

Coactivity and alternation. The types of events (e.g. coactive and alternating episodes) were summed up for each dyad, during Spontaneous conditions. These measurements were then compared with tables and graphs to show the differences in number of events between the two dyads.

Content and temporal runs. The frequencies of the pooled temporal and content runs were calculated for each mother and infant, during all three conditions separately. This data was displayed in a table to show the existing differences: 1) between the Normal and Depressed mothers, during Spontaneous conditions and 2) during Spontaneous and Sad conditions, for the Normal and the Depressed mother, respectively.

Phrase period durations. During each of the three conditions described in the preceding section (e.g. Spontaneous-Sad-Happy), and for each member of both dyads, the durations of the first 20 phrase periods were estimated. However, during certain conditions, less than 20 phrase periods occurred. That is, the depressed mother only produced 18 phrases during sad conditions. As well, the number of

phrase periods for the normal and depressed babies ranged from 15 to 20 for the three conditions. The statistical analyses accommodated for this eventuality when necessary.

All analyses were performed on a Macintosh computer, the Statsview 512 plus programme (Brainpower Inc., 1986).

For the purpose of clarity, some of the results reported in Chapter 4 are also incorporated into the following descriptions of the statistical tests performed.

Analyses consisted of Analyses of Variance (ANOVA) for the mothers, and for the infants separately. A two factor design with two levels of each factor was used.

Mothers:

In regard to the mothers, a subject by condition analysis of variance provided a comparison of mean phrase durations for each of four combinations, as follows: 1) normal mother during spontaneous conditions; 2) depressed mother during spontaneous conditions; 3) normal mother during sad conditions; and 4) depressed mother during sad conditions. Figure 2 shows these combinations.

Figure 2

The Four Cells for Mothers and Conditions

	Mothers	
Conditions	Normal	Depressed
Spontaneous	x phrase normal mother, spontaneous conditions	x phrase depressed mother, spontaneous conditions
Sad	x phrase normal mother, sad conditions	x phrase depressed mother, sad conditions

The data analysis addressed three questions. First, was there a significant difference between the two mothers in the length of their phrases? Second, did the simulation of sad conditions influence the duration of phrase periods? Third, was there an interaction between the mother's ongoing mood and the type of conditions introduced? That is, do spontaneous and sad conditions have different effects on the duration of phrases, for the normal and depressed mother?

A graphic illustration of the observed interaction is given on page 72. The graph displaying the interaction suggests that sad conditions had a substantial effect on the normal mother, but relatively little impact for the depressed mother. For example, there appeared to be a difference between the two mothers' behavior or mean phrase periods, during spontaneous conditions, but not during sad conditions.

Two a posteriori tests were performed to ascertain whether these differences were statistically significant. The a posteriori comparisons were made between the means of the two mothers during Spontaneous conditions and during Sad conditions. In order to reduce the probability of a Type I error, the Scheffe' method (Scheffe ' F test) was used to compare these means. The first Scheffe ' F test compared the mean phrase differences for the Normal and Depressed mothers during Spontaneous conditions. A second Scheffe ' F test assessed whether any significant differences existed for the Depressed and Normal mothers during Sad conditions. Those means and the results of the Scheffe ' F tests are given on pages 70 and 71 respectively.

Information dervied from these two post hoc tests addressed the research hypotheses VI (page 44), and are given as formal statistical hypotheses:

The null hypothesis states that <u>during Spontaneous conditions</u>, the mean phrase period (xi) for the Normal mother, either equals or is less than the mean phrase period (x2) of the Depressed mother. That is, there is no statistical difference between the two means; or xi is less than x2. Symbolically:

HO: x1 = or < x2 (null hypothesis)

HI: x1 = > x2 (alternative hypothesis).

The statistical hypothesis which corresponds to research hypothesis VII (page 4) has not been expressed in the null form, because it was anticipated that a null statement would not be rejected. For example, it was expected that no statistical difference would be found between the Depressed mother and the Normal mother during Sad conditions. The prediction implied that x1 would equal x2 during Sad conditions, (but not during Spontaneous conditions-alternative hypothesis VI).

Infants:

A second ANOVA provided the statistical information about the phrase periods of the two infants. The ANOVA, as described above with the mothers' data, was replicated for the infants.

Because the data were incomplete, two additional t-tests were also done, which allowed for the partial inclusion of Happy conditions in the analysis.

The missing cell and the five cells representing the possible combinations for conditions and infants are illustrated below in Figure 3.

Figure 3
The Five Cells for Infants and Conditions

	Infants	
Conditions	Normal	Depressed
Spontaneous	x phrase, normal infant, spontaneous condition	x phrase, depressed infant, spontaneous condition
Sad	x phrase normal infant sad condition	x phrase, depressed infant, sad condition

Happy	discontinued	x phrase, depressed infant, happy condition

The two way ANOVA for the infants, during Spontaneous and Sad conditions, addressed the research hypothesis VIII (page 44) and is given as a formal statistical hypothesis.

The null hypothesis states that during both Spontaneous and Sad conditions, the overall mean phrase period (xa) for the infant of the Normal mother, equals the overall mean phrase period (xb) for the infant of the Depressed mother. That is, there is no statistical difference between the means of the two subjects. Symbolically:

HO: xa=xb (null hypothesis)

HI: xa=xb (alternative hypothesis).

Research hypothesis IX (page 4) has not been stated in statistical form because it was predicted that the null hypothesis would be accepted. That is, for the infant of a Depressed mother, a significant difference in the mean phrase periods was not expected, between Spontaneous and Sad conditions.

Anciliary Tests

Two additional t-tests were used to establish: 1) When happy conditions were initiated, was there a significant change (or reduction) in the length of the phrase periods for the depressed infant? Stated as a formal statistical null hypothesis - the mean phrase periods for the infant of the Depressed mother, during Spontaneous conditions, are either equal or less than the mean phrase periods of the same infant, during Happy conditions. Symbolically:

HO: xb1 = or < xb2

HI: xb1 > xb2.

(A similar comparison for the Normal infant could not be made. Due to the distress of the Normal infant after Sad conditions were introduced, that part of the research had to be discontinued.) 2) Did Happy conditions for the Depressed infant result in a non significant

difference between that condition, and the Normal infant during Spontaneous conditions?

Because the above two separate comparisons were made, a table which furnishes t-values for unusual percentage points was used (Rahlf I. Sokal, 1981). The unusual percentage point £ ' was obtained from Sidak's multiplicative inequality; £ ' = 1 - (1 -)1/K, where is the experimentwise error rate (also known as the family wise type 1 error rate) and K is the number of comparisons intended. A value for ' was furnished for 30 degrees of freedom and provided a conservative estimate.

Significance levels:

The null hypothesis was rejected in each case, if the probability was equal to or exceeded an 0.05 level.

Trends were reported at the 0.10 level of probability.

CHAPTER IV

FINDINGS AND CONCLUSIONS

For ease of reading, the hypotheses are restated and organized into groups. These groups entail closely related phenomena. The variables studied with the two dyads provide preliminary information toward aiding more extensive and detailed research in the future. Additional anciliary findings, which will be relevant in considering interventions, are presented in the later sections of the chapter.

Hypothesis I. During Spontaneous conditions, the frequency of simultaneous or synchronous attentional cycles, for a normal mother and infant, will be greater than the number of cycles for a Depressed pair under similar conditions.

Findings. The frequency of co-occurring cycles, as defined in the foregoing methods section, was summed up for each mother-infant pair, during two consecutive minutes of the Spontaneous interaction.

The results reveal a total of six cycles for the Normal Dyad and no cycles for the Depressed Dyad. That absence of cycles for the Depressed dyad is not within the expected range as reported by Brazelton (eg. the reported average for 2 minutes is approximately 6). In contrast, the Normal dyad is obviously at an average level, in terms of the number of synchronous cycles.

Support was obtained for Hypothesis I. The total number of intensity cycles are markedly less for the Depressed dyad compared to the Normal pair.

Hypothesis II (a) In observing a Depressed and a Normal dyad, in terms of the number of coactive and alternating episodes, these events will be comparatively less for the Depressed pair.

(b) The proportion of coactivity compared to alternation will be greater for the Normal dyad and lower for the Depressed mother and infant.

Findings. The observations made to test these hypotheses are in accordance with the previously described definitions of coactivity and alternation.

Table I below shows the frequencies for these types of events during two continuous minutes of Spontaneous interactions.

Table I

Coactive and Alternating Episodes During Spontaneous Conditions

Normal Dyad		Depressed Dyad
coactive	1	3
alternating	10	Ø
Totals	11	3

As can be seen from visual comparison of the totals, the score for the Normal dyad, 11, is almost 4 times as great as the total coactivity and alternation for the Depressed pair. It is readily apparent from the results that the Normal mother and infant are engaging in a far greater degree of combined alternation and coaction.

However, in regard to the second proposition of Hypothesis II, the findings are not in the expected direction. That is, the proportion of coactivity exhibited by the Normal dyad is not larger than their alternating episodes. Moreover, as can be seen alternating events occurred with 10 times the frequency of coactivity for the Normal dyad.

Conclusion. The above results provide partial support for Hypothesis II. Although the Depressed pair did show a small degree of simultaneity, their behaviors were not likely to follow each other in an alternating fashion.

However, the coactive episodes of the Normal dyad did not exceed the coactivity of the Depressed dyad. Therefore the second prediction of Hypothesis II was not confirmed. An explanation for these unexpected findings is given in Chapter V.

The following three hypotheses are all concerned with run frequencies for the pooled temporal and content runs.

Hypothesis III. During Spontaneous conditions, the Depressed mother will show a decrease in the total number of runs, compared to a Normal mother.

Hypothesis IV. During Sad conditions, the Normal mother will show a relatively greater decrease in the total number of runs, in comparison to the Depressed mother.

Hypothesis V. During Sad conditions, an infant with a Normal mother will demonstrate a relatively greater decrement in the total number of runs, in comparison to an infant with a Depressed mother.

Findings

The immediately following Table number II displays the frequencies of runs.

Table II

Run Frequencies

Normal	Spontaneous	Sad	Happy
Totals:			
Mother	24	7	discontinued
Infant	9	4	discontinued
Depressed			
Totals			
Mother	7	7	10
Infant	8	5	4

Pooled content and temporal runs for Normal and Depressed Dyads, during Spontaneous, Sad and Happy conditions.

From examination of Table II, it is obvious that the Normal mother produced more than three times as many runs compared to the Depressed mother. Furthermore, the same discrepancy in run frequency occurred for the Normal mother during Spontaneous and Sad conditions. As well, for the Normal infant, his number of runs showed a marked decrement from Spontaneous to Sad conditions. However, the above decreases were not observed for the Depressed mother and infant when the conditions were changed from Spontaneous to Sad. Their scores for the two different conditions are approximately equal.

Conclusions

Hypotheses III and IV are both supported. The Normal mother, during Spontaneous conditions exhibited many more runs than the Depressed mother. However, the Normal mother showed a sharp decrease in runs when Sad conditions were introduced, whereas the number of runs for the Depressed mother remained stable with the initiation of Sad conditions.

With regard to the number of runs for the infants, there is also some suggestive evidence that the Normal infant produces fewer runs when the conditions are changed from Spontaneous to Sad. But in view of the small numbers, the decrease can only be considered suggestive.

In contrast to the foregoing hypotheses, the following four Hypotheses are related to brief time intervals or durations. That is, the hypothesized alterations in phrase period durations will be tested. It may be recalled that the constituents of a phrase period are the kinesic phrase and its subsequent pause.

Hypothesis VI. In comparing a Normal and a Depressed mother during Spontaneous conditions, the Depressed mother will

demonstrate a marked reduction in the average duration of her phrase periods.

Hypothesis VII. During Sad conditions, the Normal mother will show a pronounced decrease in the durations of phrase periods compared to her average length of phrase periods in the Spontaneous condition. Conversely, for the Depressed mother, her average phrase period durations will not show a significant change between Spontaneous and Sad conditions.

Hypothesis VIII. In comparing an infant of a Normal mother to an infant with a Depressed mother, the two infants will demonstrate significant differences in terms of the durations for their respective phrase periods.

Hypothesis IX. In a comparison between Spontaneous and Sad conditions, the infant of a Depressed mother will not show a significant change in his/her phrase periods.

Findings

Mothers. The mean phrase durations for the Normal and Depressed mothers, during Spontaneous and Sad conditions, are displayed in Table III below.

Table III

Mean Phrase Duration for Normal and Depressed Mothers During Spontaneous and Sad Conditions

Conditions:		Spontaneous:	Sad:	Totals:
Mother	Normal	20 $\bar{X}$ 2.155	20 $\bar{X}$ 1.63	40 1.893
	Depressed	20 $\bar{X}$ 1.25	18 $\bar{X}$ 1.311	38 1.279
Totals:		40 1.702	38 1.479	78 1.594

As can be seen from visual comparisons of the means in Table III, there appeared to be differences between some of the reported means. To ascertain whether these differences were significant a two factor ANOVA was performed.

The results of that ANOVA, which describes comparisons between subjects and conditions, are displayed below in Table IV.

Table IV:
Two Factor ANOVA for Mothers and Conditions

Source:	df:	Sum of Squares:	Mean Square:	F-test:	P value:
Mothers (A)	1	7.287	7.287	24.601	.0001
Conditions (B)	1	1.047	1.047	3.534	.064
AB	1	1.671	1.671	5.642	.0201
Error	74	21.919	.296		

It can be determined from Table IV that the differences between the two mothers are highly significant (p=.001). As well, the interaction between mothers and conditions is significant at a .02 level of probability. In contrast, the results of the comparison between Spontaneous and Sad conditions for both mothers combined show a non-significant trend (p=0.064).

In order to examine the nature of the interaction, as described in Chapter III, two post hoc tests have been calculated. The findings are exhibited in Table V, A and B respectively for: 1) Normal mother and Depressed Mother during Spontaneous conditions and 2) Normal and Depressed mothers during Sad conditions.

Table V
Normal and Depressed Mothers
A. Spontaneous conditions

Comparison:	Mean Diff.:	Scheffe ' F-Test:
Normal vs. Depressed	.905	35.776*

*Significant at 95%/p<0.05

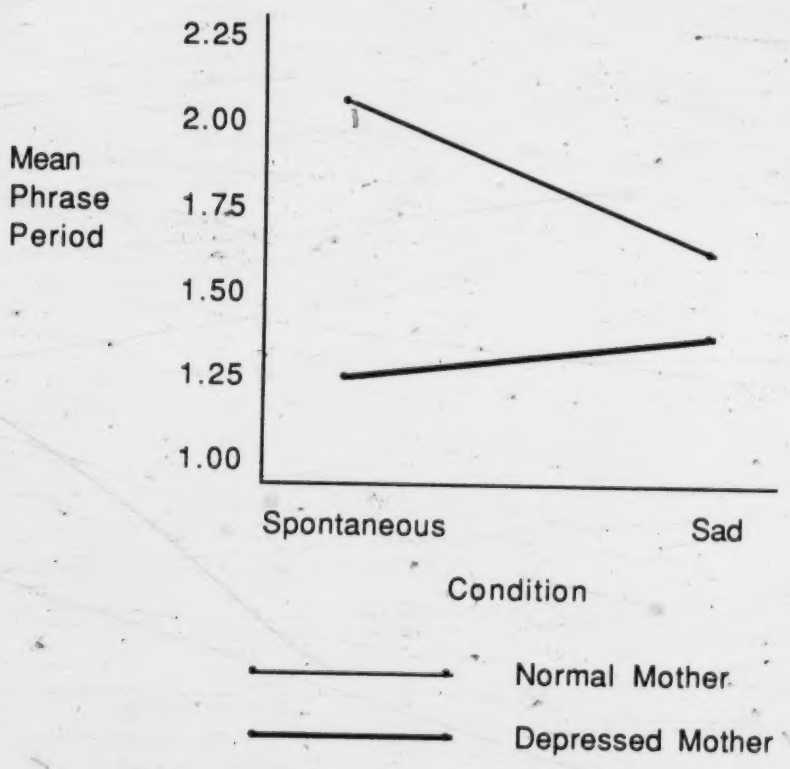
Table V
B. Sad Conditions

Comparison	Mean Diff.:	Scheffe ' F-test:
Normal vs. Depressed	.319	2.623

non significant /p>0.05

It is apparent from the Scheffe ' F-test that the differences between the mothers during Spontaneous conditions are significant ($p \leq 0.05$). Conversely, part B of Table V demonstrates a non-significant difference between the two mothers during Sad conditions. These relationships between conditions and mothers are illustrated in figure number 4.

Figure 4
Interaction Between Mothers and Conditions
for Phrase Durations



Infants. In the next section, the data for the infants is reported. The means for the infants are displayed in Table VI.

Table VI

Mean Phrase Duration for Normal and Depressed Infants During Spontaneous and Sad Conditions

Conditions:		Spontaneous:	Sad:	Totals:
Baby	Normal	17 $\bar{X}$ .647	15 $\bar{X}$ .573	32 .612
	Depressed	20 $\bar{X}$ 1.515	17 $\bar{X}$ 1.471	37 1.495
Totals:		37 1.116	32 1.05	69 1.086

It may be seen by examining this table that both the Normal and the Depressed infant showed only a slight change between Spontaneous and Sad conditions. The differences, however, are obviously pronounced when the two infants are compared to each other. A two factor ANOVA is reported in Table VII.

Table VII:

Two Factor ANOVA for Infants and Conditions

Source:	df:	Sum of Squares:	Mean Square:	F-test:	P value:
Baby (A)	1	13.298	13.298	63.22	.0001
Conditions (B)	1	.06	.06	.283	.5964
AB	1	.004	.004	.017	.8954
Error	65	13.672	.21		

From the values reported in Tables VI & VII it is clear that the phrase durations for the two infants are significantly different

(p=.0001). As pointed out above, however, neither one of the infants showed a significant change between conditions. An explanation for the latter findings will be provided in Chapter V.

Conclusions

From the results of the preceding ANOVAs and post-hoc tests, it may be stated that Hypotheses VI, VII, VIII and IX are confirmed. We can conclude that during Spontaneous conditions, the phrase periods of the Normal mother last considerably longer than her Depressed counterpart. As well, the introduction of Sad conditions had a marked impact for the Normal mother in terms of reducing the durations of these intervals. The Depressed mother showed no such reduction. Similarly, for the Depressed infant, Sad conditions did not appreciably effect the durations of his phrase periods.

Although the results reported above demonstrate a pronounced difference between the two infants, the direction of that difference is the reverse of their respective mothers. That is, the phrase durations of the Depressed infant are approximately 3 times greater than the length of phrases for the Normal infant. Conversely, when the phrase periods for the Normal mother are compared to those produced by the Depressed mother, the former are found to be significantly longer, especially during Spontaneous conditions. These results will be discussed in Chapter V.

Anciliary Findings

The data reported below relate to the durations of phrase periods for the two infants during Spontaneous and Happy conditions. Accordingly, the relevant means and standard deviations for the Spontaneous conditions are reproduced for ease of reading. In addition, the following tables also include the means and standard deviations for the Depressed infant during Happy conditions.

It is apparent, from visual inspection of Table VIII that there is a similarity in the scores for the Normal infant during Spontaneous conditions and for the Depressed infant during Happy conditions. Therefore, a t-test was performed. The results of this t-test are given in Table IX.

Table VIII :
Mean Phrase Duration for Normal Infant
During Spontaneous Conditions and for
Depressed Infant During Happy Conditions

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
Spontaneous	17	.653	.166	.04
Happy	15	.82	.326	.084

Table IX
t - test for Normal and Depressed Infants
During Spontaneous and Happy Conditions, Respectively

DF:	Unpaired t Value:	Prob.(2-tail):
30	-1.861	.0726

In regard to phrase period durations, the differences are not significant when comparing the Normal infant during Spontaneous conditions, to the Depressed infant during Happy conditions.

In the context of phrase durations, one additional comparison is also noteworthy (Table X and XI). That is, in comparing the phrase period durations of the Depressed infant during Spontaneous conditions to the same infant during Happy conditions, some interesting changes are apparent in Table X.

Table X
Mean Phrase Durations for Depressed Infant
During Spontaneous and Happy Conditions

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
Spontaneous	20	1.515	.636	.142
Happy	15	.82	.326	.084

Table XI
t - test for Depressed Infant During
Spontaneous and Happy Conditions

DF:	Unpaired t Value:	Prob.(2-tail):
33	3.86	.0005

The Depressed infant exhibited a highly significant decrease in the durations of his phrase periods when Happy conditions were introduced (p=0.005).

Conclusions

It seems clear that when the Depressed mother was instructed to intentionally arouse and stimulate her infant, certain changes occurred: 1) the phrase durations for her infant decreased; and 2) that change in duration for the Depressed infant during Happy conditions, closely approximated the Normal infant during Spontaneous conditions.

To briefly summarize, the depressed and normal dyad, with few exceptions, consistently showed discrepencies in their

intensity cycles, and for all the time parameters examined. Moreover, the Spontaneous, Sad and Happy conditions differentially effected the two dyads with respect to certain aspects of their time dimensions, specifically: 1) the number of coactive and alternating episodes, 2) the number of run occurances and 3) the durations of phrase periods.

CHAPTER V

DISCUSSION AND IMPLICATIONS

Certain qualities, such as timing and attentiveness have been shown to be important components of social interactions. It is also relevant that mother-infant "micro-rhythms" of 1/3 to 2 or 3 second intervals are potentially useful time units in measuring components of socio-emotional involvement between mother and infant. The results are similar to those obtained by Beebe & Gerstman, 1984; Beebe, Jaffe, Feldstein, Mayo & Alson, 1985; Beebe, Stern & Jaffe, 1979; Fogel, 1977; Stern et al., 1977. But, in the current study the earlier research is extended by demonstrating a difference in time patterns and mutual attentiveness for a normal and abnormal mother-infant dyad.

Another focus of the present study is upon a synthesis of information about the time and intensity variables. The results of this research imply that a coordination of time, intensity and emotion is likely. Thus, it contributes to an integration of the findings stemming from studies of the cyclical patterns, and the time parameters.

The possible enduring effects of repetitive exchanges are also an inherent aspect of this research. Therefore, the findings noted in Chapter IV are discussed in terms of how these results relate to changes in long term reactions. As well, the implications for interventions and future research are discussed.

Differences Between a Normal and Depressed Dyad

It is apparent from the findings that the number of interactive cycles are markedly different for the two dyads. In regard to the hypotheses about the episodes and runs, the results demonstrate partial support and suggestive evidence that the two dyads are dissimilar. These conflicting results (that is, some aspects were confirmed and some aspects were discomfirmed) are incorporated into the following discussion.

As pointed to in the literature review, between two to four synchronous cycles per minute can be expected during distress-free and harmonious interactions. Thus, the six cycles observed for the Normal pair suggests they are functioning in a mutually positive way during Spontaneous conditions. Nevertheless, that interaction for the Normal couple is characterized by a much greater number of alternating episodes, compared to coactivity (e.g. 10 to 1 for alternation and coactivity respectively). This unexpected finding refuted part of the second hypothesis which predicted a higher proportion of coaction for the Normal pair. However, this result is explanable in terms of the degree of positive arousal for the dyad. It may be recalled that moderate dyadic arousal is typefied by alternation, whereas high arousal is associated with coactivity. In view of the preponderance of alternation for the Normal pair, it could be concluded that they had been relating at a moderately positive level during Spontaneous conditions.

For the Depressed dyad, it is noteworthy that the occurance of both mutual cycles, as well as the combined alternating and coactive episodes, was absent or greatly decreased. These findings, in conjunction, reflect a dampening of positive arousal in the Depressed pair. Additionally, as noted previously, coaction and alternation describe simultaneous and reciprocal behaviors, respectively. Both types of behavior demonstrate reaction to a partner. Therefore, when the infrequency of their alternating and coactive behaviors are considered, it could be stated that the acts of this pair are generally unrelated to each other.

The above conclusions are further corroborated by a relative decrease in the number of runs for the Depressed mother. As mentioned in Chapter IV, the Normal mother produced more than three times the number of runs observed for the Depressed mother during Spontaneous conditions.

The findings of Beebe and Gerstman (1984) are particularly relevant in this context. Beebe and Gerstman reported that the degree of facial expressiveness and attention displayed by the infant significantly covaried with the run sequences of an adult partner.

The authors observed that the initiation of runs by the mother had a dramatic effect on the infant's expression. For example, as the mother introduced rhythmic runs of hand swing games, the infant's behavior rapidly changed from withdrawal to positive expressiveness.

In the present research, the reduced number of runs during Spontaneous conditions for the Depressed mother and during Sad conditions for the Normal mother is demonstrated. Thus, it is suggested that run frequency is another factor which reflects the positive and negative nature of the interactions for the Normal and Depressed dyad, respectively.

With one exception, the results were all strongly supportive of the hypotheses about durations of phrase periods. The marked decrement in length of phrase periods for the Depressed mother during Spontaneous conditions, and for the Normal mother during Sad conditions, parallels the findings for run occurances. (Relationships for phrase periods are illustrated in Figure 5.) These changes in phrase periods also bring into sharper focus the effects of abnormality on timing. The latter findings will be interpretated as part of a subsequent discussion regarding the long term consequences of abnormality.

However, the performance of the Depressed infant was different, in that the durations of his phrase periods did not show a decrement. On the contrary, his length of phrase periods, compared to the Normal infant, exhibited a highly significant sustained increase during Spontaneous and Sad conditions. Whereas, the length was reduced somewhat for the Happy condition.

As displayed in Tables III & VI of Chapter IV the mean durations for the Depressed mother and her infant are comparable to each other (eg. During Spontaneous conditions: Depressed mother mean phrase duration 1.25 seconds, Depressed infant mean phrase duration - 1.52 seconds.). It should be noted that infants generally produce movements which are 1/3 to 1/2 the duration of the movements for their mothers. But the Depressed infant did not exhibit this usual pattern of relatively briefer movements. Such

data imply that the increased activity of the Depressed infant reflected an effort to stimulate his mother. That conclusion is also supported by the low frequency of maternal runs, which are noted to stimulate positive behaviors for the infant.

In summary, it is clear that the micromomentary units of behavior which convey socio-emotional information overall are found to be consistently different for a Normal and for a Depressed dyad.

Coordination of Variables

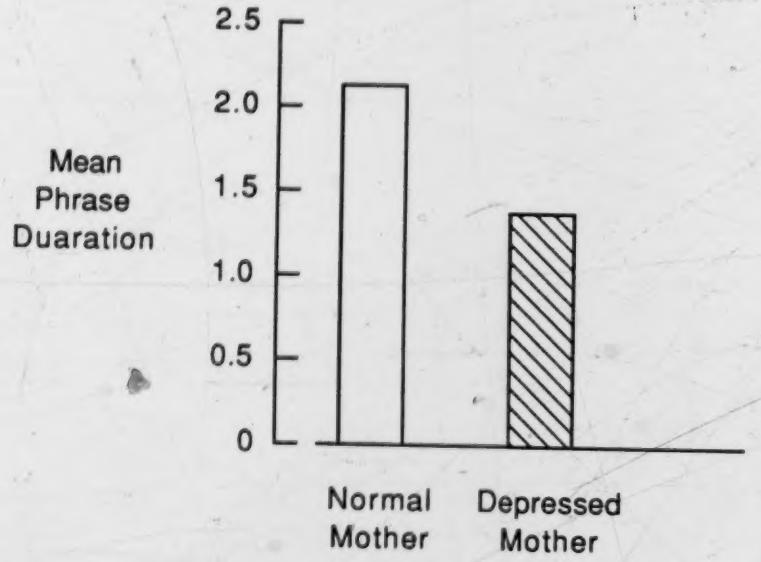
Some of the results discussed above indirectly support the posited integration of the time and intensity dimensions. For example, in the literature review, based on several studies (Brazelton et al, 1974; Fogel, 1984; Lester et al., 1985) it is concluded that stimulation and appropriate timing by the mother are important factors for mutual cyclical attentiveness. In the findings of this research, it is pertinent that the cycles and the maternal stimulation provided by runs, are decreased for the Depressed dyad. As well, for the Depressed pair, timing which is unrelated to the acts of the partner can be readily subsumed from the comparative decrease in their alternating and coactive episodes. Therefore, in view of the concurrent changes in important aspects of both time and intensity, some indirect support is obtained for the proposed coordination of these qualities during interactions.

Long Term Effects

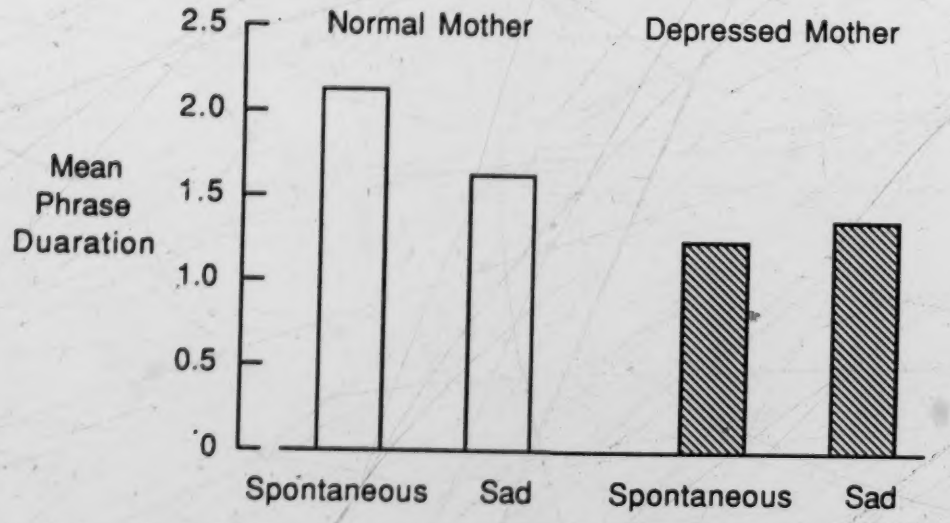
In regard to the postulated implications for long term patterns, the differences between conditions for the Normal and Depressed dyads are revealing. For example, as described above, the phrase period durations for the Normal mother precepitously declined when Sad conditions were initiated. Thus, during Sad conditions no significant statistical differences were found between the two mothers. Furthermore, the Normal infant did not recover from the upset when Happy conditions were introduced and that part of the experiment had to be terminated. Conversely, unlike the above pronounced reactions, for the Depressed mother and infant none of the measured time parameters were altered. It may be

Figure 5
Graphs Illustrating Differences in Phrase Duration
For Depressed and Normal Mothers

A. During Spontaneous Conditions



B. During Spontaneous and Sad Conditions



recalled that pronounced differences were not observed for phrase period durations between these conditions (see figure 4, page 72). Similarly, there was not an appreciable difference in the number of runs between Spontaneous and Sad conditions. This lack of change suggests the Depressed pair had adapted and apparently established a particular pattern of interpersonal exchanges. Furthermore, if cyclical patterns are coordinated with time, as argued above, then the observed decrease in mutual attentiveness is also likely to be a more permanent feature of Depressed interactions.

In general,we can conclude that the Depressed and Normal dyads show certain indications of enduring differences in their respective patterns.

Implications

Research Implications

It should be emphasized that extrapolation from the current study should be guarded as further corraborative research is needed. The study does suggest the kinds of parameters which could productively be investigated with larger numbers of normal and abnormal subjects. More information about micro units of behavior might provide a basis for detecting subtle changes during socio-emotional interactions.

In addition, particular parameters of affectively-toned behaviors were investigated separately. However, the coordination or organization of behaviors implied by the results, could be examined with more detailed observations. For example, one cyclical event could be analyzed in terms of the occurance of all measurable vocal and kinesic parameters comprising that event. Generally, early in life, affectively-toned behaviors are the primary medium of communication between mother and infant (Demos, 1982). Empirical information about these interactions, with respect to the components and their organization, might enlarge our understanding of socio-emotional development.

This type of research has implications for developmental psychology. Although considerable knowledge has been acquired about the cognitive development of infants and children, the social-emotional area is relatively neglected. The present study delineates some of the behavior which might shape social development and suggests directions for future research.

It is relevant that the changes brought about as the infant or child interacts with others is also the domain of personality development. Some of these changes have been investigated with the current research in terms of mother-infant patterns. Therefore, it is proposed that the issues which are pivotal for personality theorists, such as Freud, are researchable with the controlled conditions suggested above and considered essential by the behaviorists.

Implications for Interventions

It is noteworthy that the anciliary findings revealed the Depressed dyad in the Happy condition was similar to the Normal pair during Spontaneous conditions. For example, the mean duration of phrase periods did not show a significant difference for the Normal infant during Spontaneous conditions, and the Depressed infant during Happy conditions. Thus, it can be concluded that the experimental interventions produced favorable conditions for the Depressed dyad. As probably recalled, during Happy conditions the Depressed mother was given instructions to intentionally arouse and stimulate her infant.

In view of these findings, there are certain interventions which could be considered. For example, specific directions and practice sessions with a depressed mother may assist her to provide more attention and stimulation for her infant. Possibly those mothers who are deficient in self-motivation and need greater structure could benefit from the presence of a supportive person to encourage the interactions. Alternately, if the mother is unable to enter into adequate social interactions despite supportive efforts, then the other adults or family members could be educated to spend more play-time with the infant.

It should be stated that the differences detected in micromomentary intervals, for the Depressed dyad, were not immediately apparent at a global level. Both infants appeared well cared for and active. In fact, the Depressed mother, without questioning, claimed that the baby was "fine", but her own condition was causing personal distress. Nevertheless, the results of this analysis suggest that the infant with a Depressed mother has less opportunity to experience positive social interactions. These results have implications for psychologists, psychiatrists, nurses and counsellors. Persons in the helping professions could be educated or sensitized to the possible maladaptations between disturbed caretakers and their infants or young children. If clinicians are aware of ongoing emotional distress in a mother, then a careful evaluation of the mother-infant interaction might be appropriate. Although well defined guidelines do not exist at present, this study contributes to knowledge about the parameters which could be included in dyadic assessments.

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APPENDIX 1

DESCRIPTION OF SOME BEHAVIORAL OBERVATIONS FOR EXPERIMENT I

Attentional cycles

Infant

1) First run tapes for gestalt.
2) Then time and record the beginning and end of each cycle.
   - beginning = the first moment of gaze or head turn toward mother
   - ending = first moment of gaze or head turn down or away from mother (any segment of tape may be rerun as often as needed to identify the beginning and ending of a cycle).
3) Observe and score the initiations and terminations of attentional cycles for all six conditions.

Background for Scoring Attentional Cycles

Description of the cyclical phases:

Attentional cycles involve a gradual build up of intensity, which reaches a peak and gradually diminishes. The following description is intended to assist an observer in identifying that phenomenon. Identified behaviors may show some overlap between the phases of initiation, build up, peak excitement, and decline. However, this description is not equivalent to a template of the cyclical phases. It is given to provide an overall image of the phenomen and recognizing an attentional cycle as a gestalt is adequate for this experiment.

The infant initiates looking toward his mother with dull eyes and a relaxed face. As the gazing at her continues his eyes and face brighten, and his body orients toward her. His state of attention

begins to oscilate - his eyes alternately dull and brighten, with fleeting smiles, grimaces and vocalizations. His arms and legs may pedal slowly while his hands and feet open and close smoothly.

As the looking sequence builds up there are fewer oscilations of attention and inattention, and the jerky, lidded quality of the eyes drops out. Smiling may involve a smooth cycling build up. The smooth cycling activity of arms and legs may be interspersed with jerky reaches toward the mother. He may smile tentatively. If his mother smiles at him, he watches intently and responds by smiling for a longer period. Vocalizations may be preceded by activity such as, whirling arms, twisting of his body and straining forward with outstretched arms. Tonguing and spitting up are seen as his action accelerates to a peak of excitement.

At the peak of excitement his behavior may be jerky and intense. His smooth cycling can alternate with more high pitched activity. For example, his neck may crane forward and then arch back as he becomes excited. As well, he often twists his body from side to side. Vocalizing may build up to a pitch of output accompanied by intense activity. Smiling sometimes is dulled down as he watches his mother. Subsequently it is maintained for long periods, or terminates in laughter, spitting up or possibly crying. Alternately, during that intense state, the tension build up may be modulated and controlled by displacement behaviors (eg. bringing his hand to mouth to suck, sucking on his tongue, yawning or holding onto his hands or another part of his body).

Deceleration of excitement usually occurs gradually. His facial expression becomes duller and his body is more relaxed, with slowed down activity. Vocalizations and smiles decrease, while displacement activities increase.

He may begin another period of acceleration. Conversely, he could enter into a period of withdrawal or turning away. At that point his face and eyes are no longer oriented toward the mother.

Outline of attentional cycles:

Initiation

- begins to look back at mother with dull eyes, relaxed face
- eyebrows and cheeks may be slightly raised
- head position level or up and en face
- slowly moves extremities and body

Orientation

- eyes and face brighten
- body oriented toward mother
- extremities extend toward her
- possibly brief pointing with fingers and toes

State of attention

- alternately sends and receives cues
- arms and legs may slowly pedal
- face alerts
- eyes dull and brighten, fleeting smiles, grimaces, and vocalizations
- hand and feet open and close slowly, smoothly, fingers and toes may also move
- alternately reaches toward mother and circles back into position parallel to his own head
- general waxing and waning of body tension

Acceleration

- fewer osciliations of attention and inattention
- jerky, lidded quality to eyes drops out
- vocalizing, which is preceded by body activity, such as whirling arms, body twists, straining forward, face tense and arms stretched out
- smiling - may also involve cycling activity of body, but smoother and less intense than build up for vocalizing
- tonguing and spitting up as acceleration approaches a peak

- cycling activity of arms and legs involves wider and wider arcs
- occasional jerky reaches toward mother, but general body activity is smooth and rhythmic

Peak of excitement

- jerky and intense movements, interspersed with efforts to control excitement such as sucing hand or tongue, yawning, holding his hands or another part of his body
- (background behaviors which are seen during stop-frame analysis) - attention and inattention, saccadic movements, brief periods of dulling down of intensity, lidding of eyes, and blinks, intent smiling, and vocalizing with constant slow movement and change in facial musculature as he reacts
- vocalizing may build up to a pitch of output, accompanied by intense activity
- smiling may be maintained for long periods
- if mother smiles back, he dulls down and responds with a a wider smile
- laughing, spitting up or crying may be the end result
- cycling activity becomes more excited and high pitched activity of arms and legs
- neck may crane forward and body twists from side to side
- the intense activity alternates with cyclical smooth body behavior

Deceleration

- usually ends excitement gradually, bright look dims, eyes dull down and lid over, face duller and more relaxed
- smile fades
- vocalizing ceases or becomes decreased in pitch, intensity and variability. May vocalize with dull, monotonous quality
- tonguing and yawning may increase

- eye blinks increase in number and duration of each blink
- leans backward, more relaxed position
- holds onto parts of self, chair, clothes, sucks thumb, fingers hair or ears
- cycling of extremities becomes smoother and more restricted
- hands may be loosely clenched or wide and flat

Withdrawal or turning away

- looks down or away
- glazed or dull expression, reduced activity, face and eyes oriented away from mother
- may lean back in chair, suck fingers, finger his other hand, turn body halfway from mother, tongue his lips, suck tongue, play with clothing, finger mother's hand absent-mindedly
- may vocalize into the room, yawn or whimper half-heartedly, smile into the distance

Mother

Vocalizations

The positive extreme is reflected in vocal patterns which are highly "infantized" in emphasis, pitch and volume. ie. loud enough to become a focus of the mother's activity at that point in the interaction.

Qualities to be noted:

1) little vocalization
2) whisper
3) volume variable - medium to loud
4) soft, neutral - in expression, muted
5) little emphasis to much emphasis during bursts

6) drawing out of sound at the end of each burst
7) variation in pitch internal to each burst

Attention:

1) towards baby's face
2) look away from face, but on baby's body
3) looking away from baby, but related to interaction (eg. looking at a toy used in playing with the infant)
4) looking away from baby, not related to interaction

Head position:

1) towards and level, down, or up
2) part side and level, down, or up
3) complete side and level, down, or up
4) positions 1 & 2 above with small nodding, shaking, or cocking of head
5) position 1 & 2 above with medium size to large nodding, shaking or cocking, but not sustained
6) position 1& 2 above with sustained cocked head
7) thrusting head forward towards baby with neck extension, or head tilted
8) nuzzling baby with head
9) gone

Facial expression:

1) angry face
2) full frown
3) serious, sad or sober
4) lidded
5) neutral, flat
6) bright
7) animated, bright
8) simple smile
9) play face of low intensity
10) purse-lipped kiss

11) smile of moderate intensity
12) play face of moderate intensity
13) broad, full smile
14) "superlook" playface
15) "oooooo" face

Hands:

1) abrupt handling of baby which involves a large shift in baby's position
2) sudden adjustment of body position
3) sudden abrupt contact which is intrusive but does not entail changing infant's position
4) single hand or finger poke
5) abrupt wipe of face
6) rough, jerky movement of infant
7) jerky jiggling of baby's limbs
8) rough pouncing on infant's body
9) rough pulling to sit
10) hands not in contact with baby, but mokther is moving them nervously without relating to infant
11) mother rubbing eyes, adjusting her own hair, etc.
12) mother tapping side of chair, etc.
13) no movement or use of hands
14) mother using hands to contain her baby or to gently adjust
15) gentle containment of infant's body or limbs without movement
16) non-abrupt adjustment of baby's body or head to midline
17) small movements which contact infant's body or limbs
18) light tapping or small stroking or cycling of limbs or body
19) gently "picking" or "grooming" movements on body
20) slight adjustment which is not of whole body or head
21) gentle medium sized movements, emphasis is moderate
22) gentle medium to large cycling of infant's limbs
23) gentle pull to sit
24) tapping or lightly stroking baby's face

25) emphatic, but gentle stroking of baby's body
26) intensive movements of baby - emphatic, but not poking or abrupt
27) intense tickling
28) stroking baby's face with intensity
29) large full body stroking

Body Position:

1) looking away from alcove
2) turns full body to side
3) sitting back and still
4) slumping near neutral
5) neutral, slight forward lean
6) sitting down on chair
7) large sideway shifting without curving bodyk
8) slight rocking forward and back
9) large sideway shift into line of vision with curving of body
10) medium lean forward
11) large forward and back rocking
12) movement forward, close to baby and sustained

APPENDIX 2

CONSENT FORM

Date:
Name:

The investigator is interested in observing mother-infant interactions and obtaining information from mothers about their feelings. I understand that the interactions with my baby will be recorded and I will be asked to fill in a questionnaire about how I am feeling.

Participation in the research will involve 2 sessions (lasting about 10 minutes) when the infant and his/her mother are playing together. Audio-tape and videotape recordings will be made of those play sessions. In addition, questionnaires about how the mother is feeling, will take approximately 10 minutes to complete.

The recordings, and the answers given to the questions are considered confidential and identifying information will not be given to any party other than the investigators and their assistants without my consent. Although information from this study may be published, no identifying information will be given in any publication. The recordings may also be used for inservice education at the discretion of the investigator.

To make sure that I fully understand the procedures, the investigator will answer any of my enquiries. I understand that I may decline to enter the study or withdraw from the investigation at any time.

Signature of subject _____ Date signed _____

APPENDIX 3

GLOSSARY

General Relevance of Terms:

The symbolic content of behavior, in conjunction with other non-content qualities defines the principal aspects of interpersonal communication. In regard to those other non-content qualities, some anecdotal illustrations may demonstrate their relevance for communiction. For example, if an individual remains silent for approximately three seconds before responding to a comment, it will feel like a long delay, to most adults. Indeed, the delay or lapse in time itself, would be meaningful information for the average adult. e.g. after greeting an acquaintance with a "Hi", if he/she waits for three or more seconds before answering, it would seem as if something is "wrong".

In addition, during a conversation, a silence lasting more than three seconds, would convey the impression that the previous subject was concluded and a new one was about to be introduced.

From another perspective, consider the statements, "I love you", or "I hate you". Obviously, the tone of voice, rapidity of speech and facial expression accompanying these two statements, are likely to be different. The message or meaning of the statements are disclosed by the content and "other" characteristics. Those other characteristics typically evoke reactions in people, but operate primarily outside of their awareness. The characteristics or qualities are carried by parameters such as, the timing and duration of vocal bursts (a continuous or uninterrupted vocalization) and facial expressiveness.

Although vocal exchanges are also relevant during infancy, generally when interacting with a noverbal infant, bodily, gestural and facial movements are more prominent vocalizations. Interestingly, these kinesic expressions utilize many of the same characteristics noted in vocalizations, including bursts of facial and bodily movements, followed by a behavioral pause or silence. This

burst-pause pattern is produced by both mothers and the infants, as young as three to four months of age. Further, the durations of these expressive movements frequently show evidence of time matching between the partners. For example, regression analyses have demonstrated that mothers and infants may influence each other to increase or decrease their durations of movements.

Definition of Terms:

The particular aspects of mother-infant movements, studied in this thesis, are listed and defined in the following section.

1. Kinesic phrase and pause.

Definition- a movement or kinesic phrase, in the context of this thesis, is defined as a meaningful segment of behavior, which is in the process of changing. More explicitly, a kinesic phrase refers to any facial and/or head movement or constellation of movements that a)constitutes a burst of behavior and b) that has the obvious intention to attract, hold, or in some way alter the infant's attention. A pause refers to the behavioral silence or relatively inactive period, which follows a phrase.

Examples-

	Description of behavior	(in seconds) Duration of Phrase	Duration of Pause
Mother	head circle, forward and down, back and up	1.2	1.7
Infant	head and torso forward, arms up and reaching out in direction of mother, hands open	.4	.6

2. Runs.

Definition- a content run was considered to be two or more repeats of the particular activity or kinesic phrase episode. For example, if the mother's hand and head movements were both identical, in form, to the immediately preceding one, it was categorized as a content run.

Examples-
Infant

Description of behavior	(in seconds) Duration of phrase	Duration of pause
1. hands open and close' mouth bowing	1.0	.8
2. hands open and close, mouth bowing	.5	.5

Definition- a temporal run consisted of one or more repetitions of a kinesic phrase (irrespective of the particular content or behavioral form) and pause period which did not exceed certain time limits. The following time limits were used as the criteria for a temporal run: l)two or more repeating phrases which did not differ from each other by more than 0.3 seconds in duration and 2)two or more repeated pause durations which did not differ by more than 0.3 seconds.

Examples-
Mother

Description of behavior	(in seconds) Duration of phrase	Duration of pause
1. head wiggles side to side and touching infant's belly (nuzzling)	1.5	.8
2. head back, chin tuck down, "ooh"mouth	1.3	.9

In considering the effect of content and temporal runs, it is noteworthy that repetitiousness is one of the important "infant

ellicited" behaviors and infants are known to be especially responsive to maternal runs.

3. Coactive and alternating episodes.

Definition- if any portion of a phrase overlapped in time with the partner's phrase, then the episode was designated as a simultaneous or coactive event. In contrast, an alternating episode was scored if either of the following criteria were fulfilled: the beginning of the mother's phrase occurred during the infants pause and within one second after the pause was initiated. Conversely, the infant's phrase could begin within one second after the mother's pause began, to meet the criteria of alternation.

Example of alternation-

Mother	Phrase (1.0 sec) head circle down, up and back	Pause (1.0 sec)
Infant	Phrase (.6 sec) head forward and down, torso arched, smile mouth	Pause (.8 sec)

Example of coaction-

Mother	Phrase (1.8 sec) head nod up and down, finger tap infant's belly, smile mouth	(no pause)
Infant	Phrase (.8 sec) head back, torso arched, arm and hand reach up	

Both alternation and coactivity are important time patterns that are exhibited by mother and infant when they are coordinating their behaviors. If coactive and alternating patterns are reduced in

frequency or occurances, it then may reflect less mutual reaction between a pair.

Composite examples: phrases, runs, and coactive and alternating episodes measured as units of behavior are given on the next page.

4. Mutual cycles.

The degree of affective involvement and attentiveness to each other, can be further delineated by noting the number of synchronous cycles for dyads during their interactions.

Definition- cycles of heightened attentiveness are relatively long units of behavior (approximately 15 to 30 seconds), which include phrases, runs, and alternating or coactive episodes. Further, a cycle of attention involves a composite of several expressive modalities (e.g.facial expression, head and body position, eye direction and movements).

Descriptive example-

Typically a cycle begins with an initiation phase. For example, the mother may come in with an exaggerated "mock surprise" facial expression. At this point, the infant may sit far back in its seat, look in her direction and remain still. Finally the infant begins to respond and a mutual orientation phase is initiated. The infant, while looking at the mother, may then raise its eyebrows, straighten its body, and cycle its arms and legs in her direction. Gradually they build up to a peak of heightened reciprocal movements, facial displays and smiles. Subsequently, the excitement and vivacity of behaviors subsides.

When mother and iniant are involved in play periods with each other, these cycles of engagement generally occur at the rate of two to four per minute.

Relationship of Characteristics or Units of Behavior to Questions Asked in This Study:

It is pertinent that many studies (Beebe & Gerstman. 1984; Beebe et a1.,1985; Jasnow & Feldstein, 1986; Stern et al., 1985) with adult participants and with mother-infant pairs, suggest these units of behavior defined in the preceding section, convey emotional meaning (e.g. interactive empathy and warmth, or indifference).

Another type of study (Field, 1984) supports the hypothesis that the infants of depressed mothers and the infants with normal mothers react differently from each other, during diverse situations. These differences in behavior are noted during both spontaneous or natural play periods and when they are upset by a situation. For example, the infants of depressed mothers show moderate levels of ongoing negative affect, with relatively little change between spontaneous play periods, and distressing situations. Conversely, infants with normal mothers display a greater degree of positive behaviors during spontaneous conditions. Interestingly, compared to "depressed" infants, the normal ones also show signiiicantly more protest and negative affect during transient upsetting situations. (Spontaneous play periods, and simulated sad and happy conditions have been used in this study.)

The observed differences described above, are presumed to be, in part, related to the pairs past history of numerous behavioral interactions. Further, some of the other qualities or characteristics which appear to be implicated in the display and understanding of social--emotional information, may also be associated with these observed changes in affect. Thus,it is expected that the timing and/or occurances of behavior, such as mutual cycles, runs, coactive and alternating episodes, and the durations of phrase periods are also effected dif.erentially, depending on the past experiences of the mothers and infants.